Volume 21 Study AFS-42-8-B

STATE OF ALASKA

Jay S. Hammond, Governor

Annual Performance Report for

DEVELOPMENT OF TECHNIQUES FOR ENHANCEMENT AND MANAGEMENT OF ANADROMOUS CUTTHROAT TROUT IN SOUTHEAST ALASKA

by

Darwin E. Jones

ALASKA DEPARTMENT OF FISH AND GAME
Ronald O. Skoog, Commissioner

SPORT FISH DIVISION
Rupert E. Andrews, Director

TABLE OF CONTENTS

Job No. AFS-42-8-B Development of Techniques for Enhancement and Management of Anadromous Cutthroat Trout in Southeast Alaska
By: Darwin E. Jones

Page

LIST OF FIGURES

LIST OF TABLES

TABLE OF CONTENTS (Cont'd.)

RESEARCH PROJECT SEGMENT

State:	ALASKA	Name:	Sport Fish Investigations in Alaska
Study No.:	AFS-42	Study Title:	A STUDY OF CUTTHROAT--STEELHEAD IN ALASKA
Job No.:	AFS-42-8-B	Job Title:	Development of Techniques for Enhancement and Management of Anadromous Cutthroat Trout in Southeast Alaska

Period Covered: July 1, 1979 to June 30, 1980

ABSTRACT

This report covers the fourth year of study on the developement of techniques for the management and enhancement of the cutthroat trout, Salmo clarki Richardson, in southeast Alaska.

Work during the reporting period included surveys of potential cutthroat trout brood stock sources, developing techniques for the assessment of cutthroat harvest in southeast Alaska and the development of techniques for determining cutthroat population size in selected lakes in southeast Alaska.

Surveys were made of the Hasselborg and Thoms Lake systems to determine their suitability as sources of cutthroat brood stock. Hasselborg Lake is a large land-locked lake system on central Admiralty Island. A total of three inlets to Hasselborg Lake were surveyed in 1979. All three appeared to contain suitable cutthroat habitat and potential weir/trap sites were investigated. No spawners were present in the inlets at the time of the survey, however, mature pre-spawners were captured in Hasselborg Lake adjacent to all inlets. Pathalogical examination of Hasselborg Lake cutthroat showed them to be free of both BKD and IHN. Thoms Lake on Wrangell Island appears to meet the major criteria necessary for a brood stock source. Two small inlets would provide trapping sites and there appears to be a moderate population of trout available. Hasselborg Lake system would be the prime candidate for brood stock for hatcheries in northern southeast Alaska while Thoms Lake would be suitable for use as a brood source for hatcheries in central and southern southeastern Alaska.

Two mail surveys of cutthroat fishermen were conducted in late 1978 and 1979. Obtaining harvest estimates for numerous widespread cutthroat fish-

eries has proven difficult in southeast Alaska. Voluntary mail surveys were initiated in 1978 and were again used for eight area cutthroat fisheries in 1979. Response to the questionnaires ranged from 9 percent to 54 percent. This return was better than returns recorded in 1978. Harvest of cutthroat ranged from 54 at Salmon Bay Lake to the reported high of 415 at Wilson Lake. Expanded estimates of cutthroat harvest from the eight systems were 7,500 fish. A statewide sport fish harvest survey was taken in late 1978. Data from this survey became available during 1979. Cutthroat trout harvest was found to be heaviest in the Ketchikan area where 8,401 fish were reported harvested. Yakutat had the lowest harvest with only 136 cutthroat reported. The total area harvest of cutthroat for 1978 was 23,188, which is higher than that recorded in 1977.

The standing population of cutthroat trout was investigated in two lakes during 1979. Virginia Lake, located southeast of Wrangell, is a popular cutthroat lake that has a reputation as a "trophy" fishery. To determine the existing cutthroat population in Virgina Lake, 24 days were spent employing fyke net, fry traps and hook and line, to capture, mark and release and recapture cutthroat. During the summer a total of 1,165 cutthroat were captured, marked and released. A total of 89 trout were recaptured. The estimated standing crop of cutthroat in Virginia Lake was computed to be 5,631 trout. Harvey Lake, near Petersburg is a typical small island muskeg lake. Harvey Lake is not considered a "trophy" water, however, it does support considerable angling effort. A total of 12 days were spent on Harvey Lake to capture, mark and release 89 cutthroat. A total of five trout were recaptured. The estimated standing crop of cutthroat in Harvey Lake was computed to be only 669 trout.

BACKGROUND

Research conducted on cutthroat during the past 8 years at Petersburg Creek and other systems throughout southeast Alaska has begun to provide the background data necessary to manage the various stocks of cutthroat.

Two important facts about cutthroat have become apparent during past investigations. First was the finding that most cutthroat systems are populated by slow growing, old fish. In southeast Alaska's cold waters, it requires 5 or 6 years to produce a mature cutthroat of over 300 mm (12 in). This slow growth means that only a small percentage of the population spawns annually. Second it has been demonstrated at Petersburg Creek (Jones, 1976) that moderate fishing pressure has caused a steady decline in cutthroat numbers under the existing overly liberal bag and possession limits. The decline of cutthroat numbers is not uniform throughout southeast Alaska. Studies at Lake Eva, (Armstrong, 1971) a remote, lightly fished system, did not demonstrate a marked flucuation in cutthroat numbers from year to year. With the ever-expanding logging road systems in southeast Alaska, there are not too many Lake Eva's left. In addition, there are increasing numbers of anglers with the time and resources to reach out to the more remote systems.

The development of techniques for the management and enhancement of cutthroat trout in southeast Alaska has now taken on an organized form with the completion of the cutthroat management and enhancement plan.

RECOMMENDATIONS

Management

1. Develop brood stocks of cutthroat at the Fisheries Rehabilitation Enhancement Division hatchery facilities in southeast Alaska.

   Enhancement of existing cutthroat fisheries near populated areas will become necessary within the next few years. In addition, new put and take fisheries may be desirable in some specific locations. To accomplish this, brood stocks of both resident and anadromous cutthroat will be required at two or more of the F.R.E.D. hatcheries in southeast Alaska.

2. Evaluate the new "four fish" bag and possession limits for cutthroat in the more popular fisheries in southeast Alaska.

   Creel census checks of anglers fishing the more popular cutthroat systems should be undertaken to determine if the new "four fish" limits are indeed reducing the overall harvest of cutthroat. Much of this will be obtained from anglers utilizing U.S. Forest Service recreational cabins and from the statewide harvest questionnaire conducted by the Division of Sport Fish.

Research

1. Guidelines should be developed for the establishment of brood stocks of both resident and sea-run cutthroat.

   The use of hatchery-reared cutthroat to enhance or create new fisheries for resident and sea-run cutthroat has and is occurring throughout the Pacific Northwest. Programs with resident cutthroat have been mostly successful, however, programs with sea-run cutthroat have generally been less successful. It is recommended that work continue in southeast Alaska to select wild brood stock sources best suited to the fisheries desired and that these findings be turned over to the F.R.E.D. Division for action.

2. Additional background data on cutthroat populations in southeast Alaska should be gathered on an annual basis.

   Many data gaps exist on most of the cutthroat populations throughout southeast Alaska. Additional information will be needed on these cutthroat systems in order to make sound management recommendations to the Forest Service and other land use agencies. This information will also be necessary to evaluate systems for future enhancement with hatchery produced cutthroat.

3. Develop techniques for estimating cutthroat trout populations from selected lakes in Southeast.

   Baseline data on standing populations of cutthroat in area lakes will be necessary in order to formulate good management programs for these waters.

A list of common names, scientific names and abbreviations of all species mentioned in this report is presented in Table 1.

OBJECTIVES

1. Determine systems that may be suitable for obtaining cutthroat trout brood stock for use at the various hatchery facilities throughout southeast Alaska.

2. Develop techniques for determining the harvest rates of cutthroat population in southeast Alaska.

3. Develop techniques for estimating cutthroat trout populations from select lakes in southeast Alaska.

TECHNIQUES USED

To determine systems in southeast Alaska that are suitable for cutthroat trout brood stock development, the following information was gathered from the Hasselborg Lake system and the Thoms Lake system:

1. Approximate strength of the cutthroat spawning population.

2. General health of the cutthroat population (e.g.) pathological examination of adult spawners.

3. Impact of egg taking operations on existing sport fisheries.

4. Capture methodology (e.g.) weirs, seine traps, etc.

Foot surveys, hook and line and gill nets were employed to capture cutthroat from the two systems for samples.

The determination of the harvest rates of cutthroat in Southeast was obtained by:

1. Summarizing the statewide mail sport fish questionnaire for all known cutthroat fisheries in Southeast.

2. The use of a questionnaire survey of anglers using selected recreational cabins at Hasselborg, Turner, Virginia, Salmon Bay, Wilson and Humpback Lakes and on Castle River and Duncan Salt Chuck.

Table 1. List of common names, scientific names and abbreviations of fish found in study area.

Common Name	Scientific Name & Author	Abbreviation
Cutthroat Trout	Salmo clarke, Richardson	CT
Steelhead Trout	Salmo gairdneri, Richardson	SH
Rainbow Trout	Salmo gairdneri, Richardson	RR
Dolly Varden	Salvelinus malma, (Walbaum)	DV
Coho Salmon	Oncorhynchus kisutch, (Walbaum)	SS
Pink Salmon	Oncorhynchus gorbuscha, (Walbaum)	PS

Techniques for estimating cutthroat trout populations from selected lakes were tested.

1. Cutthroat were captured in Harvey and Virgina Lakes from June through mid-September. Capture methods included; hook and line, baited minnow traps, beach seine and trap nets.

2. All captured cutthroat trout were measured (fork length), marked by punching a hole in the upper lobe of the caudal fin, and released.

3. All recaptured cutthroat were noted and the lake population size was estimated by using Schnabel and Schamcher estimates.

FINDINGS

Cutthroat Brood Stock Development

The enhancement of some cutthroat trout populations and the creation of new fisheries will be a necessary management tool in specific locations in southeast Alaska in the next few years. In order to enhance these fishereies, a reliable supply of cutthroat trout will be required at one or more hatcheries. At the present time there are no cutthroat brood stocks in any of the hatcheries.

Surveys of two systems were made during 1979 to determine their suitability and potential as sources for cutthroat eggs for brood stock development.

The Hasselborg Lake system, located in mid-Admiralty Island, was surveyed during early May, 1979. Hasselborg Lake (Figure 1) is one of the larger land locked cutthroat lakes on Admiralty Island. A total of ten major inlets and several minor inlets flow into Hasselborg Lake. During the May 1979 survey, the northern half of the lake was covered with ice and the survey was limited to three inlets in the southern half of the lake. The outlet (Hasselborg) was also surveyed during 1979.

An unnamed inlet, approximately 1.5 km southeast of Camp Shaheen or 1.8 km from the outlet was surveyed for .5 km above Hasselborg Lake. This inlet, in the area surveyed, averaged 7 m in width with several deep pools, log jams and a low beaver dam (Figure 2). The lower stream bottom was composed of mud and sand. Spawning gravel began approximately 0.5 km above Hasselborg Lake where the stream gradient began to rise. An excellent potential weir/trap site was located in this area.

McKinney Creek (Figure 3), located on the west side of Hasselborg Lake, directly across from inlet #1, was the next inlet surveyed. McKinney Creek is of moderate gradient with a substrate of rock and gravel. This stream averaged 10 m in width in the 0.5 km area surveyed. A possible weir site was located approximately 0.6 km above Hasselborg Lake where cut banks would provide the necessary bulkheads for weir construction.

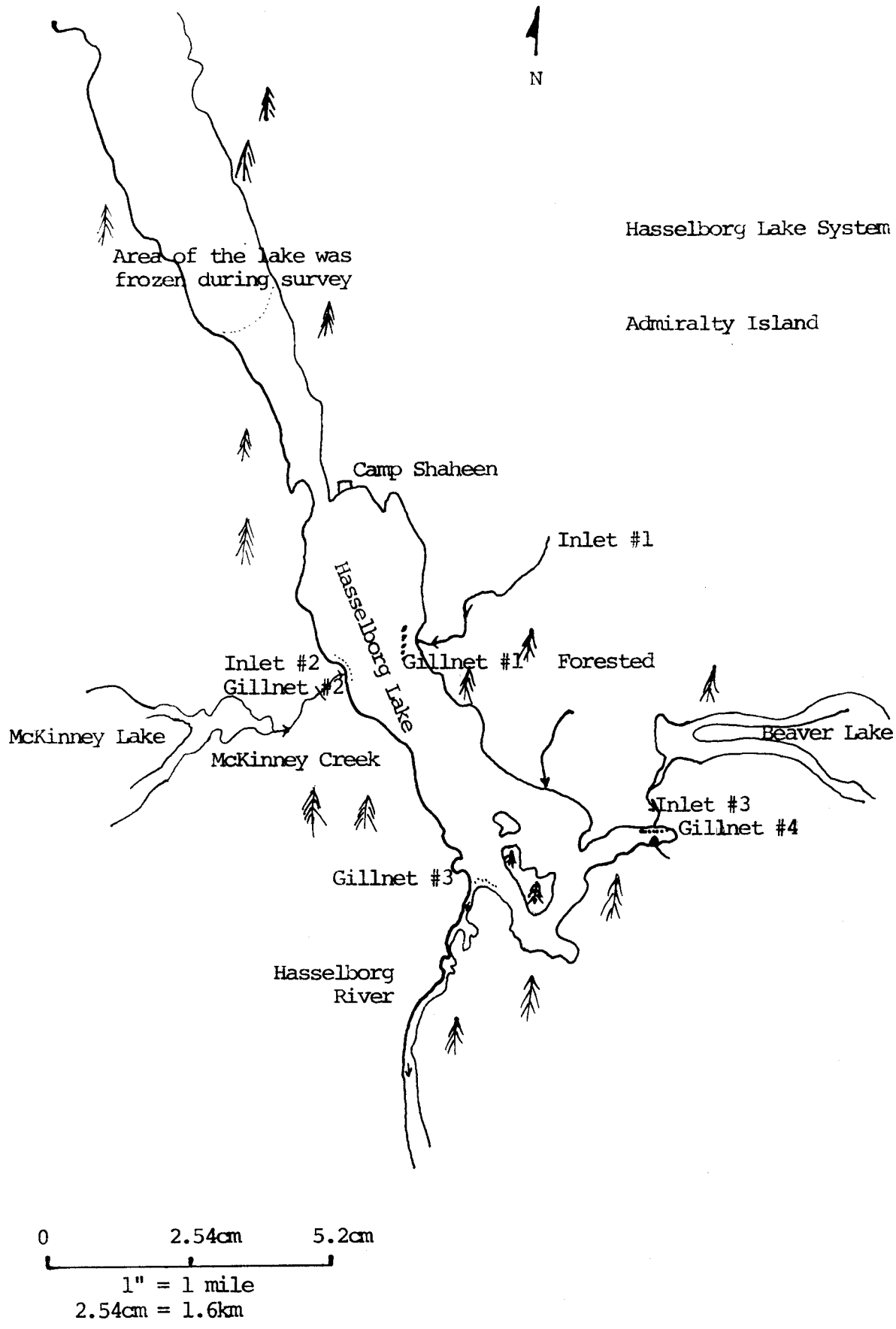

N
Hasselborg Lake System
Admiralty Island
Area of the lake was frozen during survey
Camp Shaheen
Inlet #1
Hasselborg Lake
Inlet #2
Gillnet #2
Gillnet #1
Forested
McKinney Lake
McKinney Creek
Beaver Lake
Inlet #3
Gillnet #4
Gillnet #3
Hasselborg River
0
2.54cm
5.2cm
1" = 1 mile
2.54cm = 1.6km

Figure 1

Hasselborg Lake
East Central Inlet - 2nd
Maine Inlet South of Camp
Shaheen on the East Shore.
Inlet #1 surveyed 1979

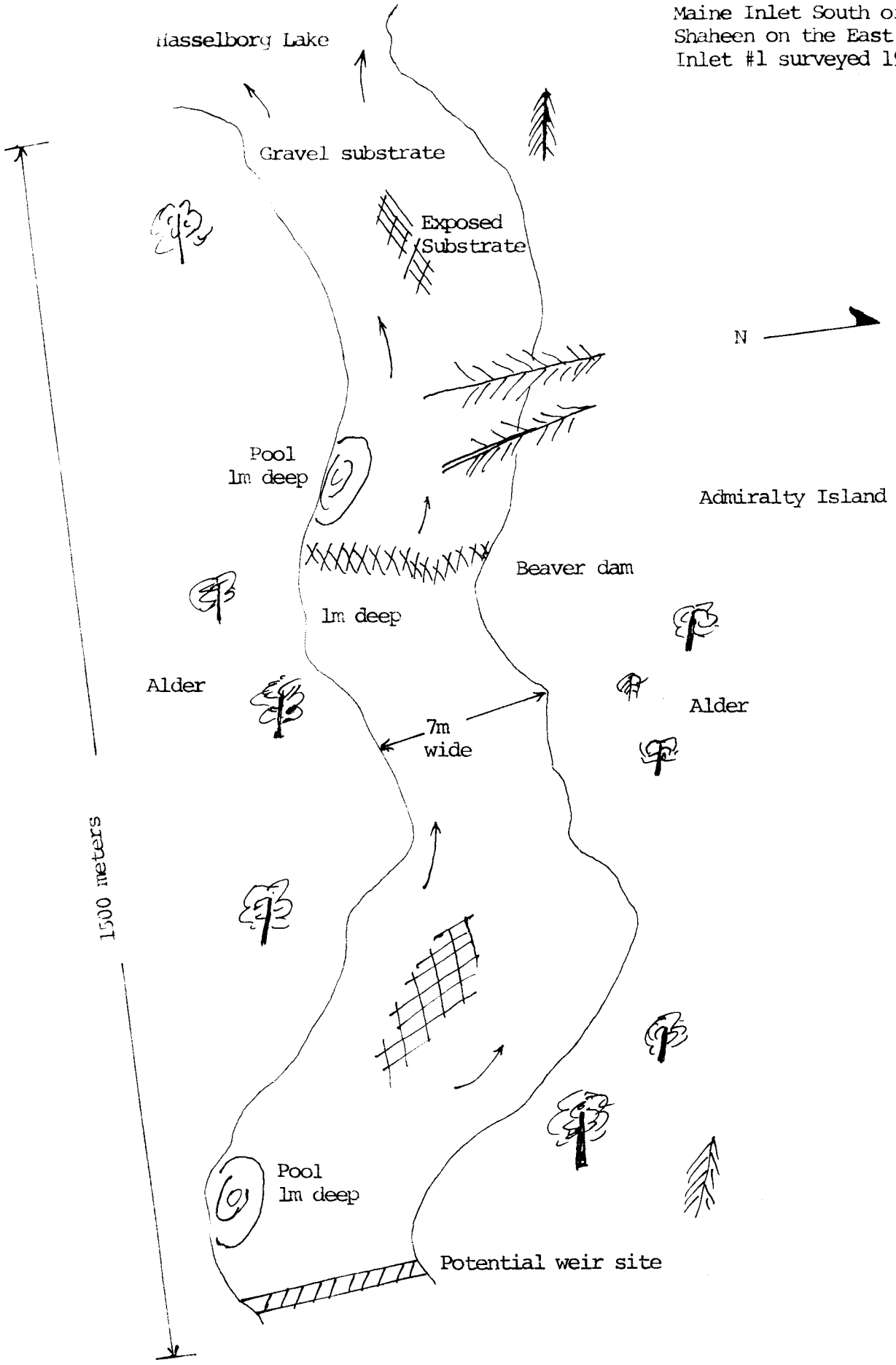


Figure 2

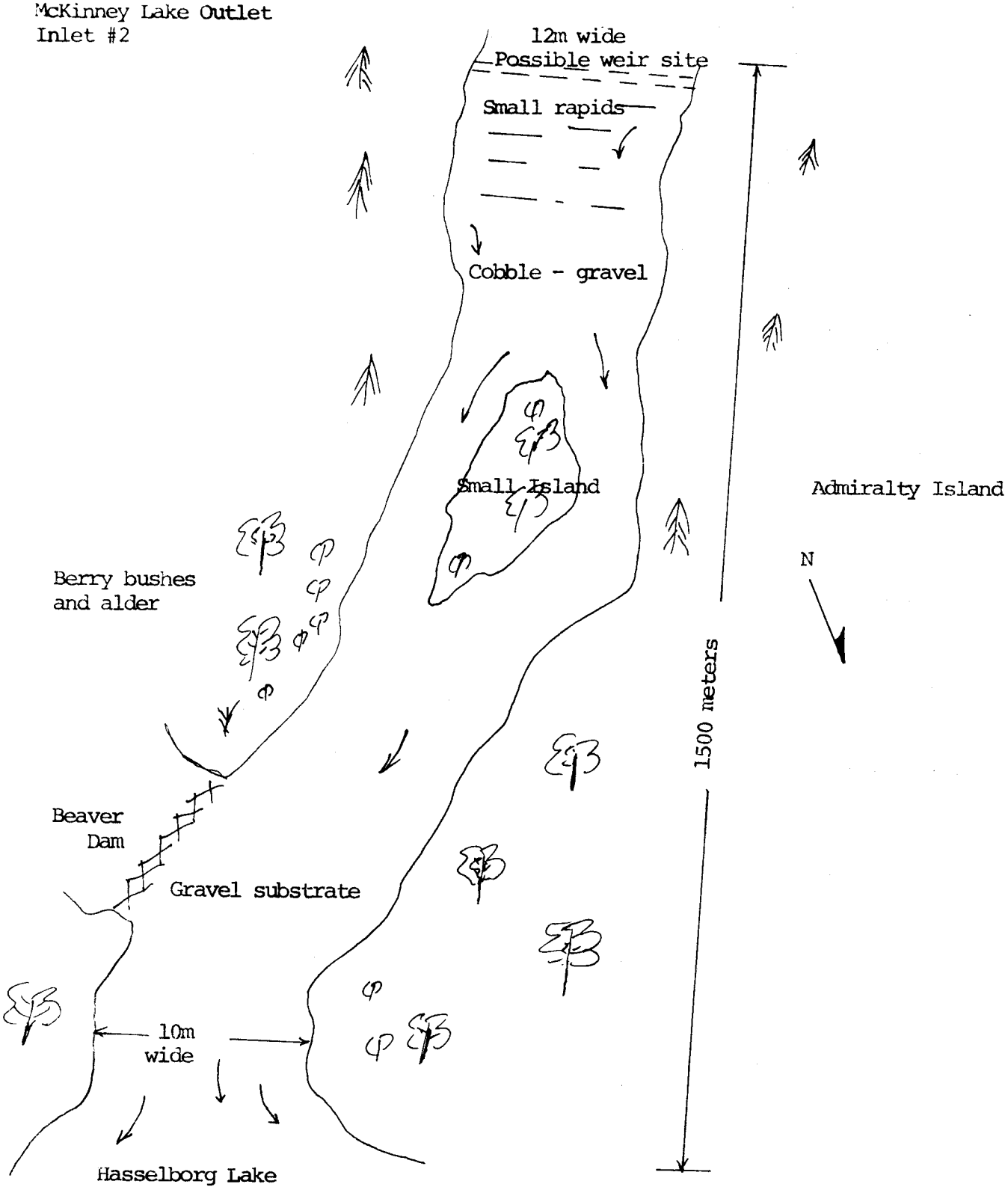

McKinney Lake Outlet
Inlet #2
12m wide
Possible weir site
Small rapids
Cobble - gravel
Small Island
Admiralty Island
N
Berry bushes
and alder
1500 meters
Beaver
Dam
Gravel substrate
10m
wide
Hasselborg Lake

Figure 3

Beaver Creek (Figure 4) enters Hasselborg Lake at the southeast corner approximately 2 km from the outlet. Beaver Creek was the smallest of the three inlets surveyed, averaging less than 4 m in width. Beaver Creek is of moderate gradient with excellent spawning gravel available a short distance above Hasselborg Lake. The first 0.6 km was surveyed and was found to contain numerous weir sites. Of the three inlets surveyed, Beaver Creek appeared to be the most stable in regards to high water flow.

Hasselborg River was surveyed down stream for a distance of 1 km. Hasselborg River averaged over 30 m in width and was flowing at a rate of over 28 cubic m per second. This large size and volume would be difficult to weir effectively, and it is unlikely that many cutthroat use this area for spawning as most of the substrate was composed of bedrock and large cobbles.

During the foot survey of all three inlets and the outlet, hook and line sampling was employed to sample for spawning cutthroat. No cutthroat were noted in any of the streams and may be due in part to their cold water temperature (3-4°C) as compared to the warm 5-6°C water of Hasselborg Lake.

In an effort to locate cutthroat spawners, gill nets were set across the mouths of the inlets (Figure 1) to determine if mature cutthroat were preparing to move upstream to spawn. A net was also employed near the outlet of Hasselborg Lake to determine if mature cutthroat were moving down stream to spawn.

Four gill nets were set for an average of 18 hours each. A total of 83 cutthroat, 13 Dolly Varden and four kokanee salmon were captured. Sexually mature cutthroat were found to be numerous near all three inlets, however, only a few were captured near the outlet. No spawned out cutthroat were captured indicating that spawning was just beginning for the year.

A total of 60 sexually mature cutthroat were sampled for pathological examination. Samples of kidney, GI tract and ovarian fluid were collected and forwarded to the pathology lab for examination. Results of tests for BKD and IHN proved negative.

A random sample of 25 cutthroat were selected for age-length relationship. These cutthroat ranged in size from 190 mm and age 4, to 470 mm at age 9 (Table 2). Nearly half of the cutthroat sampled were between 220 and 280 mm and ranged in age from 5 to 9 years of age.

All inlets surveyed contained excellent trap or weir sites near Hasselborg Lake. No surveys were possible of the five inlets in the northern half of the lake due to the late ice cover.

Thoms Lake is a 152 hectare body of water 80 m above sea level located on Wrangell Island 27 km south-southeast from the town of Wrangell. The outlet, Thoms Creek, flows 6.4 km in a southerly direction to tidewater at Thoms Place (Figure 5).

Hasselborg Lake Inlet #3

Beaver Lake Outlet

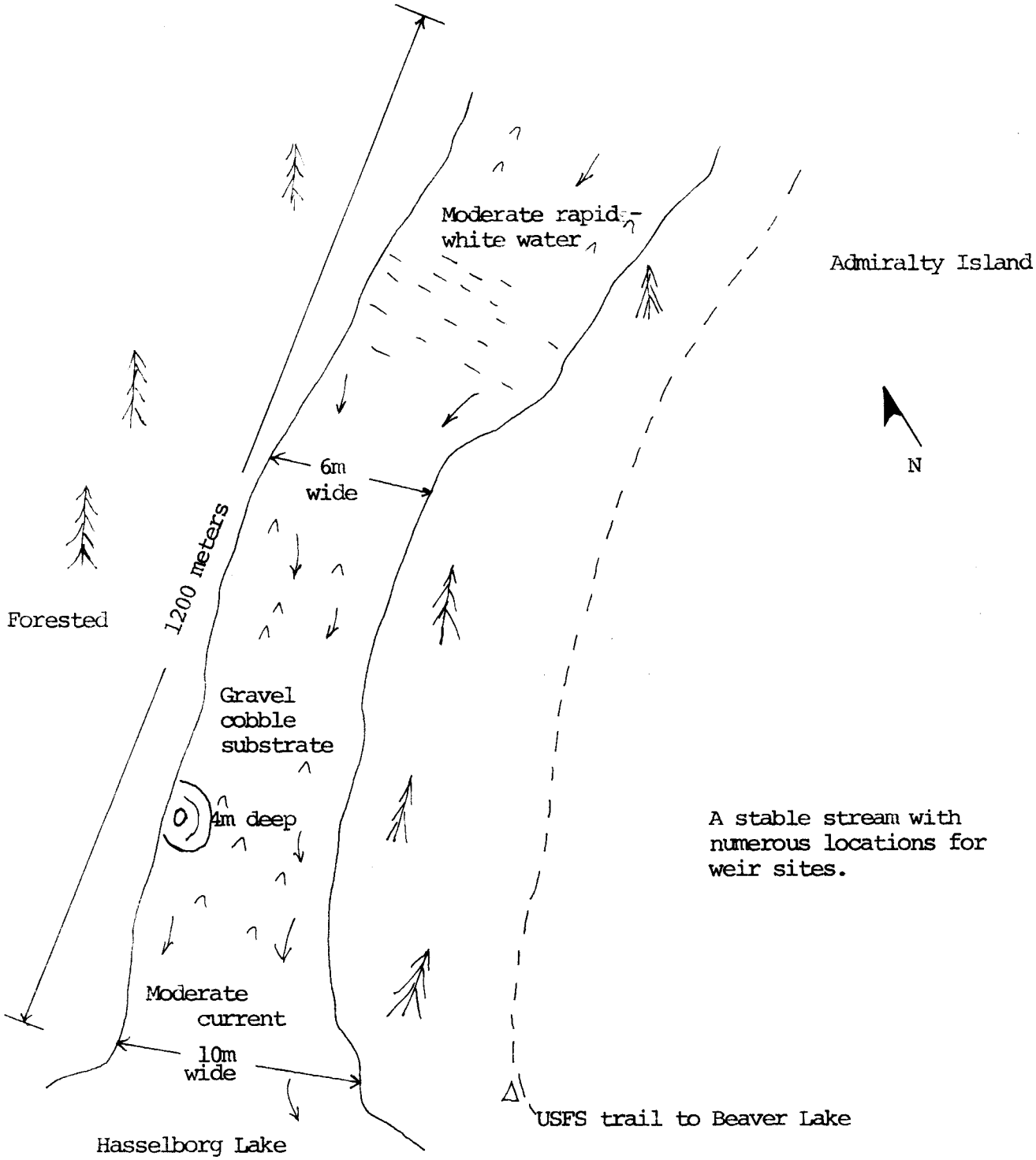


Figure 4

Table 2. Age-length Relationship of Cutthroat, Hasselborg Lake, May 1979

Fork Length (mm)	Age (Number of Annuli) 4	5	6	7	8	9	Total	Percent of Total *
181-200	2						2	8.3
201-220	2						2	8.3
221-240		2		1			3	12.5
240-260			2	1	1	1	5	20.8
261-280			1	1	1		3	12.5
281-300				1			1	4.2
301-320							0	0.0
321-340					1		1	4.2
341-360				1			1	4.2
361-380			1				1	4.2
381-400							0	0.0
401-420							0	0.0
421-440							0	0.0
441-460					1	1	2	8.3
461-480						3	3	12.5
TOTAL	4	2	4	5	4	5	24	100.0
Percent of Total *	16.7	8.3	16.7	20.8	16.7	20.8	100.0	
Average Fork Length	201.2	231.0	286.2	280.6	325.7	424.6		

* Percentages rounded to nearest tenth.

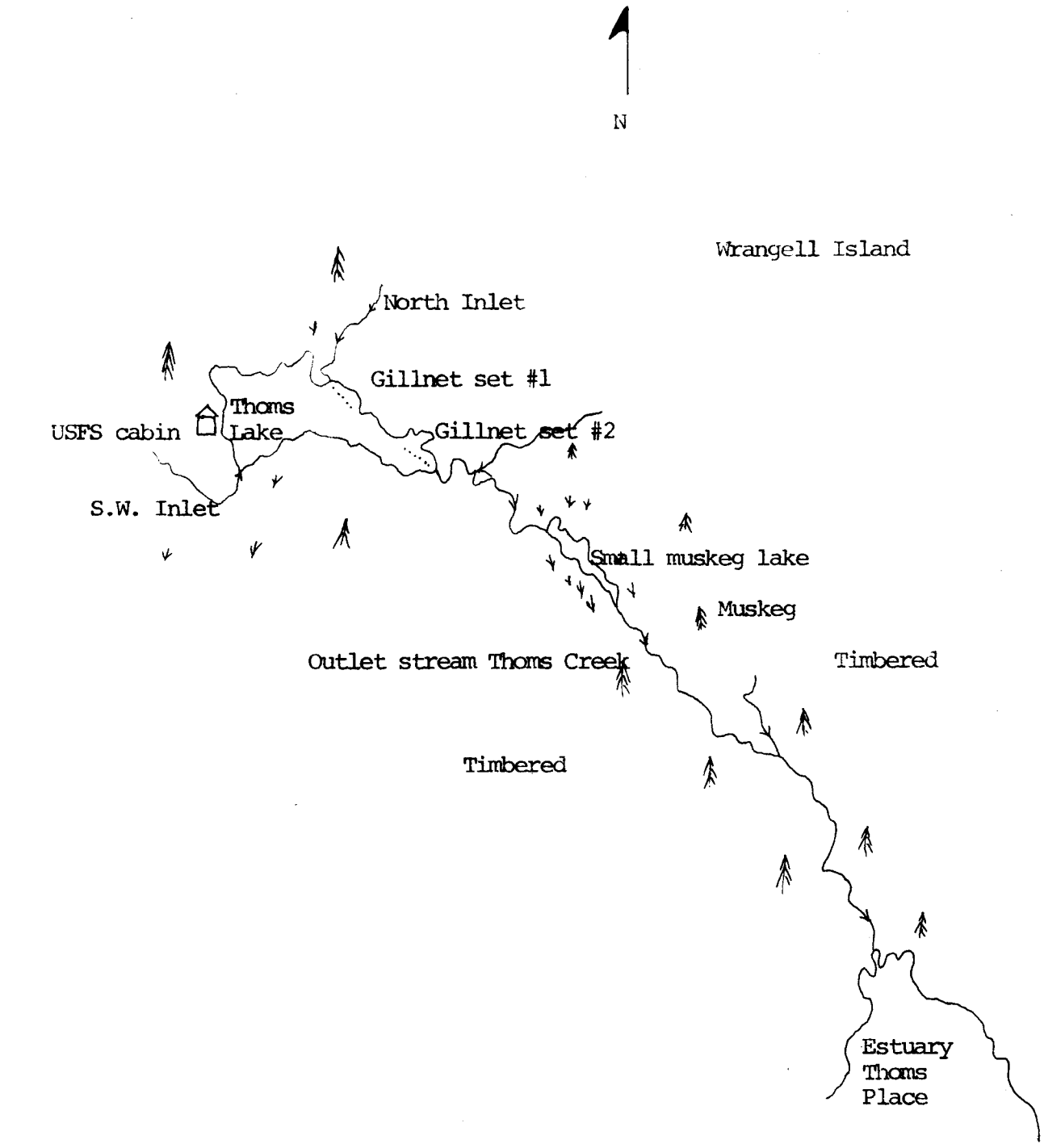

N
Wrangell Island
North Inlet
Gillnet set #1
Thoms
Lake
USFS cabin
Gillnet set #2
S.W. Inlet
Small muskeg lake
Muskeg
Outlet stream Thoms Creek
Timbered
Timbered
Estuary
Thoms
Place
0
2.54cm
5.2cm
1" = 1 mile
2.54cm = 1.6km

Figure 5

Thoms Lake system was surveyed in late April and early May, 1979 to assess the system as a potential source for cutthroat for use at one of the hatchery facilities. Thoms Lake system is home to both an anadromous race and a resident race of cutthroat. These two races occupy the lake during the winter and utilize the same areas for spawning. Sea-run and resident cutthroat are nearly impossible to separate when sexually mature and appear to form one gene pool on the spawning grounds.

Two small inlets enter Thoms Lake. One enters from the north near the upper end of the lake and the other enters from the southwest near mid-lake. The southwest inlet (Figure 6) is characterized as a narrow 2-4 m wide, meandering muskeg slough fed by run-off from a large muskeg area. Very little spawning area was located as the substrate was mostly mud and moss covered rock. No actively spawning cutthroat were noted during the survey.

The northeast inlet to Thoms Lake (Figure 7) is a bit larger averaging 7-9 m in width. Surveys in early May revealed that this inlet provides excellent spawning habitat throughout the first 2 km. The inlet is characterized by clear, free flowing water and a substrate of sand, gravel and some bedrock. Deep pools (1-2 m) and wind fall trees provide adequate cover. No adult cutthroat was observed in this inlet, which may have been due to the cold (3°C) water at the time of the survey.

Thoms Creek (Figure 8), from Thoms Lake to tide water, was surveyed in mid-May, 1979. Thoms Creek from Thoms Lake is a slow meandering stream 8-9 m wide for approximately 1.2 km below the lake. At this point it passes through a small muskeg lake. Below the muskeg lake Thoms Creek increases in gradient and size. Spawning gravel was found in several stretches, however, the majority of the stream bed was large rock and exposed bedrock. Rod and reel sampling yielded several spawned out cutthroat. These fish appeared to be headed for salt water after spawning.

A sample of adult cutthroat was obtained from Thoms Lake on May 1, 1979. Two gill nets were set for 18 hours each near the inlets to Thoms Lake. A total of 36 cutthroat were captured. These fish ranged in size from 172 to 425 mm. Thirty of the cutthroat were sexually mature and were nearing spawning condition. It would appear that these fish were maturing in Thoms Lake before entering the inlets to spawn. No pathological samples were collected, however, if Thoms Lake is selected as a brood stock source, this sampling will be done.

All cutthroat captured in the gill nets were sampled for age-length relationships (Table 3). The cutthroat were found to range in age from 4 to 11 with 69% in the 5 and 6-year age groups. The cutthroat ranged in size from 170 to 435 mm with 58% of the total in the 180 to 260 mm size class.

Development of Techniques to Determine Harvest Rates of Cutthroat Trout in southeast Alaska

The annual harvest of cutthroat trout from this area's lakes and streams has been largely unknown until 1977. Specific studies at Lake Eva (Armstrong, 1971) and at Petersburg Creek (Jones, 1977) provided harvest

South Inlet to Thoms Lake

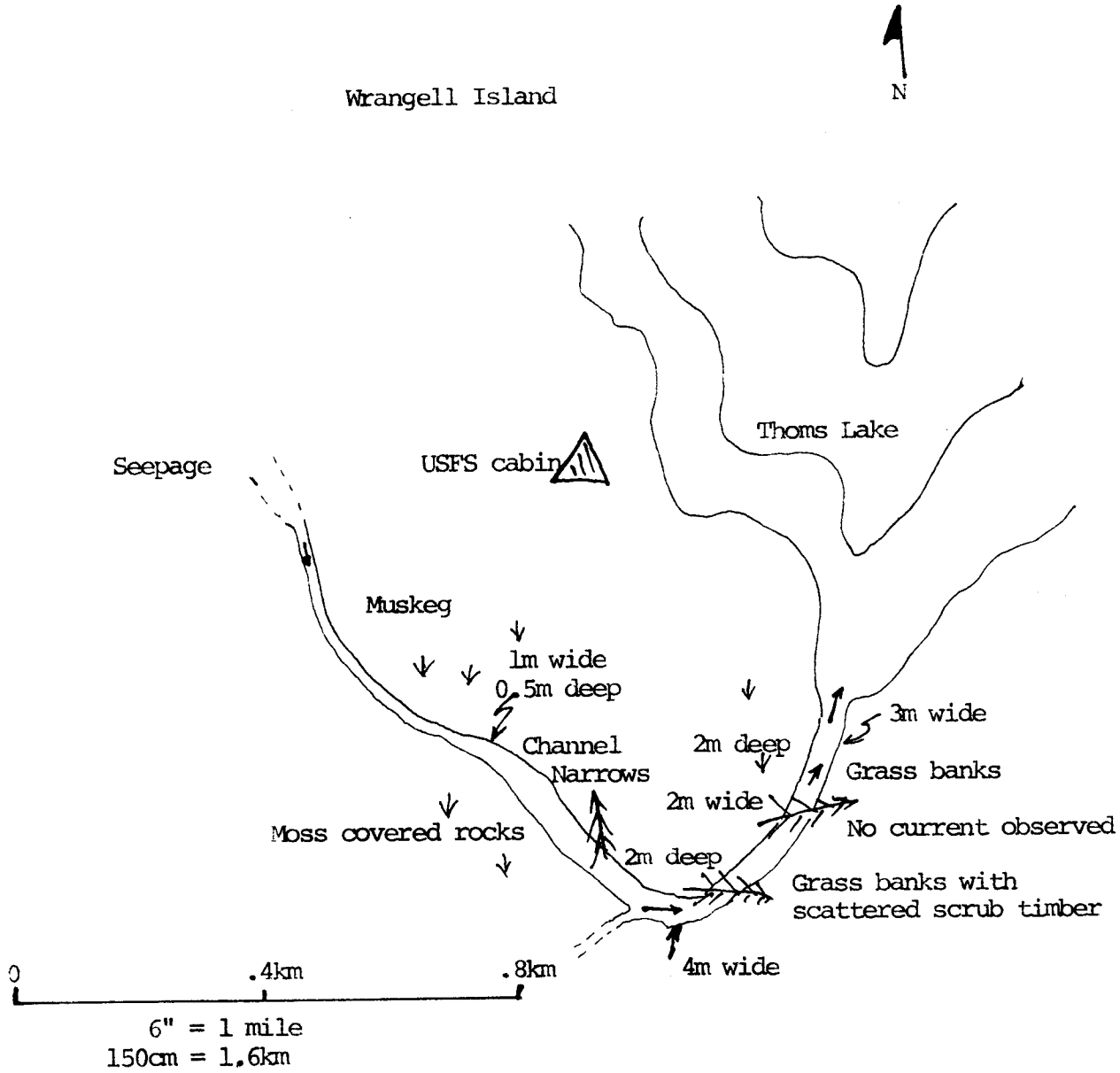


Figure 6

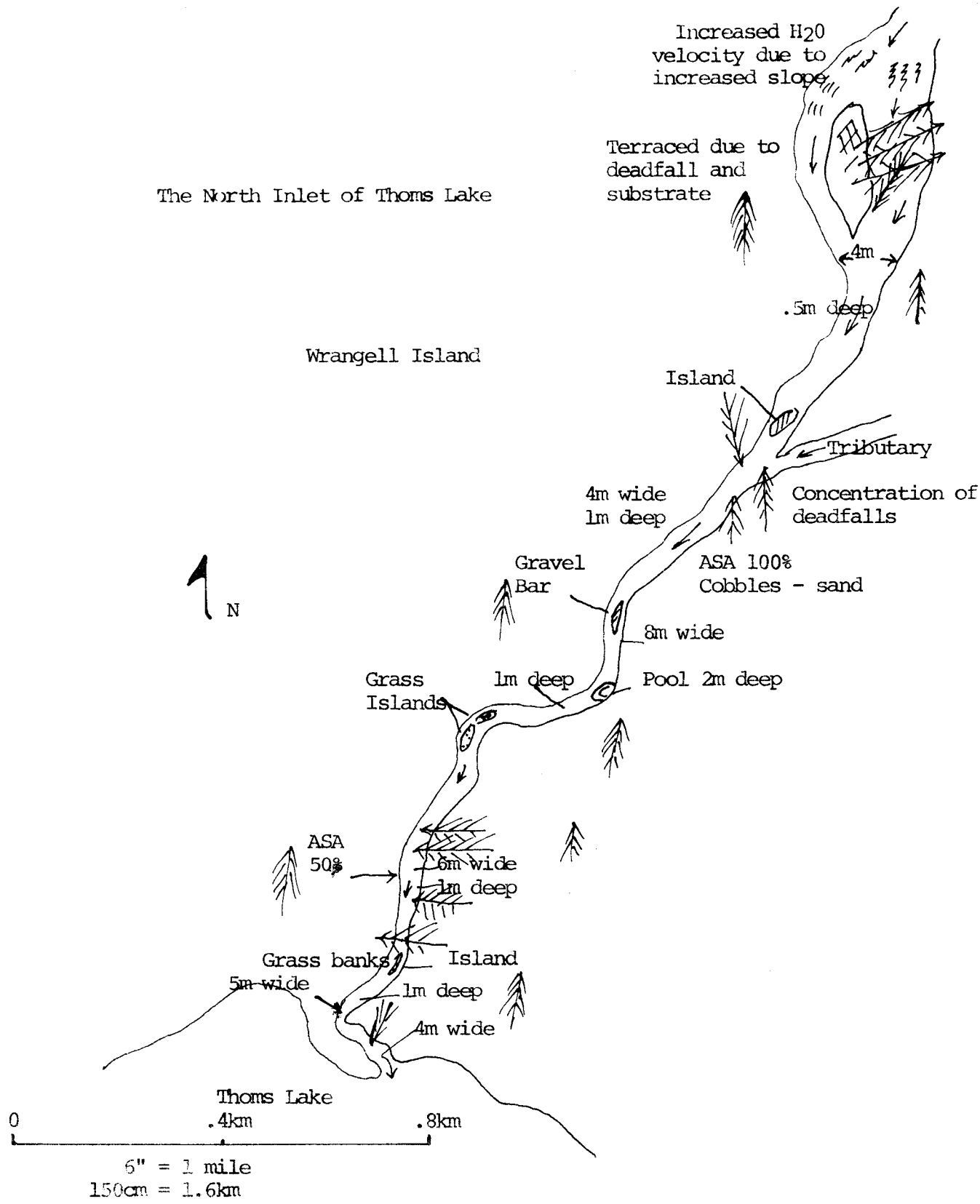

The North Inlet of Thoms Lake
Increased H20 velocity due to increased slope
Terraced due to deadfall and substrate
4m
.5m deep
Wrangell Island
Island
Tributary
4m wide
1m deep
Concentration of deadfalls
N
Gravel Bar
ASA 100% Cobbles - sand
8m wide
Grass Islands
1m deep
Pool 2m deep
ASA 50%
6m wide
1m deep
Grass banks
Island
5m wide
1m deep
4m wide
Thoms Lake
0
.4km
.8km
6" = 1 mile
150cm = 1.6km

Figure 7

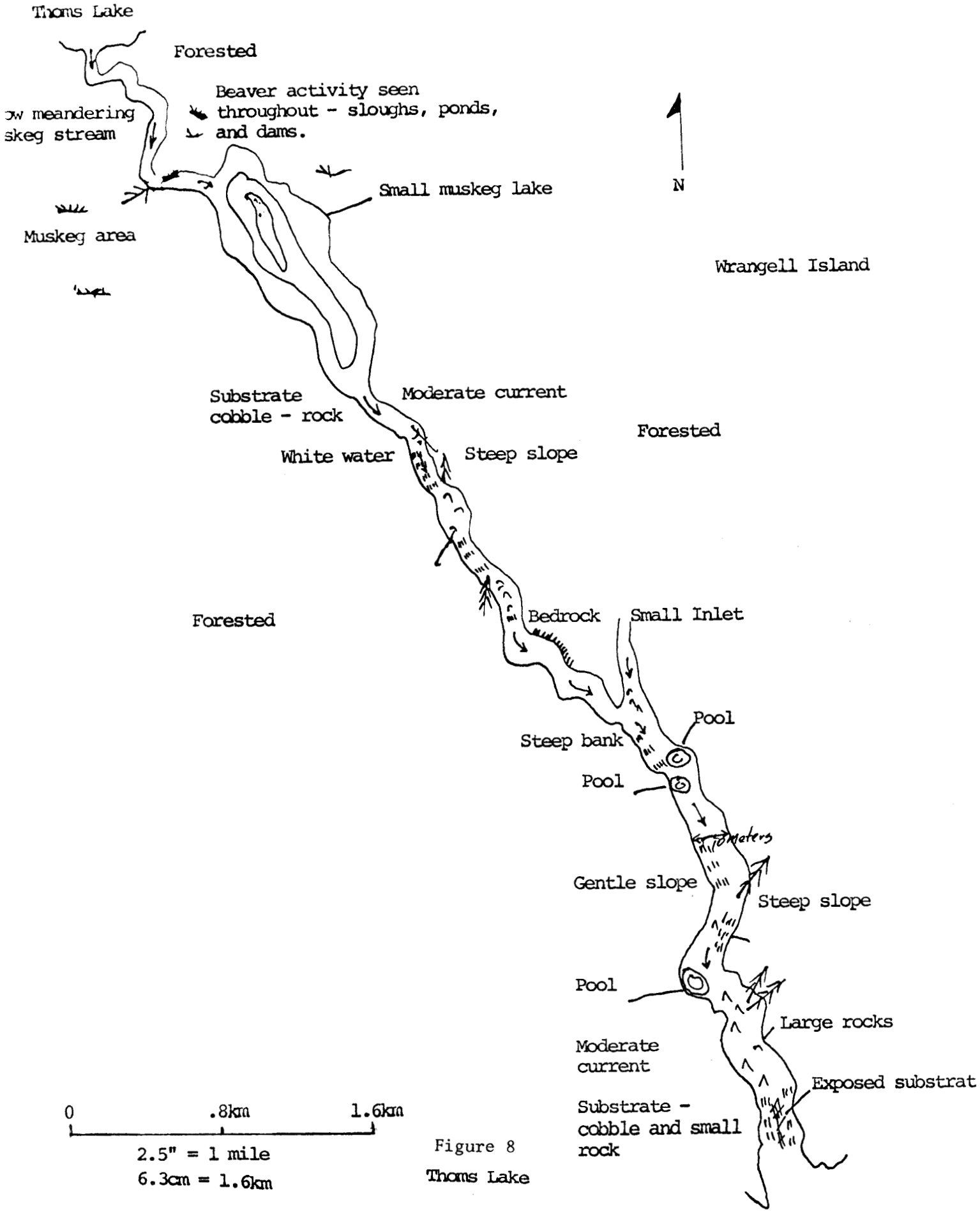


Figure 8

Thoms Lake

Table 3. Age-length Relationship of Cutthroat, Thoms Lake, May 1979

Fork Length (mm)	Age (Number of Annuli) 4	5	6	7	8	9	10	11	Total	Percent of Total *
161-180	1								1	2.8
181-200	4	4							8	22.2
201-220		4	1	1					6	16.7
221-240		1	1						2	5.5
241-260		4	1						5	13.9
261-280			2		1				3	8.3
281-300		1	1	1					3	8.3
301-320		2							2	5.5
321-340				1					1	2.8
341-360		1	2	1					4	11.1
361-380									0	0.0
381-400									0	0.0
401-420									0	0.0
421-440								1	1	2.8
Total	5	17	8	4	1	0	0	1	36	99.9
Percent of Total *	13.9	47.2	22.2	11.1	2.8	0	0	2.8	100.0	
Average Fork Length (mm)	185.8	241.7	279.9	298.7	274.0	...	...	425.0		

estimates on specific stream systems. These two studies were quite informative for local management, however, they did not provide an area wide estimate of cutthroat harvest.

Due to the numerous cutthroat waters in Southeast and the shortage of manpower, it is impractical to attempt a physical count census on most fisheries. In order to obtain the information needed for management, two types of mail censuses were begun in 1978 and were continued in 1979. One of these surveys was directed toward obtaining information on specific waters and the other was directed toward obtaining information on all cutthroat fisheries throughout southeast Alaska.

Many of the better cutthroat waters in Southeast have recreational cabins constructed and maintained by the U.S. Forest Service. Use of these cabins require the payment of a use fee and usually limits the number of people on a particular system at any one time to the renting party.

A questionnaire (Figure 9) was developed to obtain harvest information from anglers utilizing cabins on eight cutthroat systems throughout Southeast in 1979. These systems were pre-selected for study on the basis that they contain excellent populations of cutthroat and, in some cases, are considered as trophy fish waters for cutthroat. Locations of the cutthroat systems censused in 1979 are presented in Figure 10. Harvest questionnaires were issued to each party of fishermen when they picked up their cabin permits at the various Forest Service offices throughout the area.

Questionnaires were issued to fishing parties beginning in June and were continued through September. Completed questionnaires began to be received in July and continued on a sporadic basis through October. In November, a copy of the Forest Service cabin rental records was obtained. Returned questionnaires were then cross referenced to obtain an estimate of response from anglers (Table 4).

Angler response to the harvest questionnaire in 1979 ranged from a low of 9% at Hasselborg Lake to the high of 54% at Humpback Lake. Comparing returns from 1979 to those of 1978 (Jones, 1979), the 1979 returns showed a slight improvement in returns, however, the 16% return of questionnaires in 1979 is below the desired level of response. Two years data are only a start, however, it continues to show that cutthroat waters near the larger populated centers of Juneau and Ketchikan receive the majority of fishing pressure.

Presented in Table 5 are the summaries of fish harvested and released by anglers fishing the eight areas. Catches of cutthroat ranged from a low of 54 at Salmon Bay Lake to a high of 415 at Wilson Lake. Cutthroat catches were up in 1979 from those reported in 1978. Angler hours were also up in 1979 over 1978. The expanded estimate of the cutthroat harvest in 1979 was 7,500 fish from all eight areas.

A statewide sport fish harvest survey was conducted for the first time in 1977 and was again conducted in 1978. Results of the 1978 survey only became available in late 1979. The design of this survey has remained unchanged from 1977 (Mills, 1979).

STATE OF ALASKA

JAY S. HAMMOND, Governor

DEPARTMENT OF FISH & GAME

P. O. Box 667
Petersburg, Alaska 99833

June 22, 1979

Dear Angler:

The Alaska Department of Fish and Game is currently formulating a management plan for the sport fishery on selected waters in Southeast Alaska.

Your assistance in providing information for this plan is requested by filling in this questionnaire. Results of this survey will help the Department of Fish and Game provide continued high quaility angling in Southeast Alaska.

Lake Fished _____ Date: From _____ to _____

1) Number in party _____

2) Anglers in party _____

3) Number of days fished ____ Hours per day _____

4) Fish caught and kept:

Number of cutthroat _____

Number of Dolly Varden _____

Number of rainbow _____

Number of salmon _____

5) Fish caught and released:

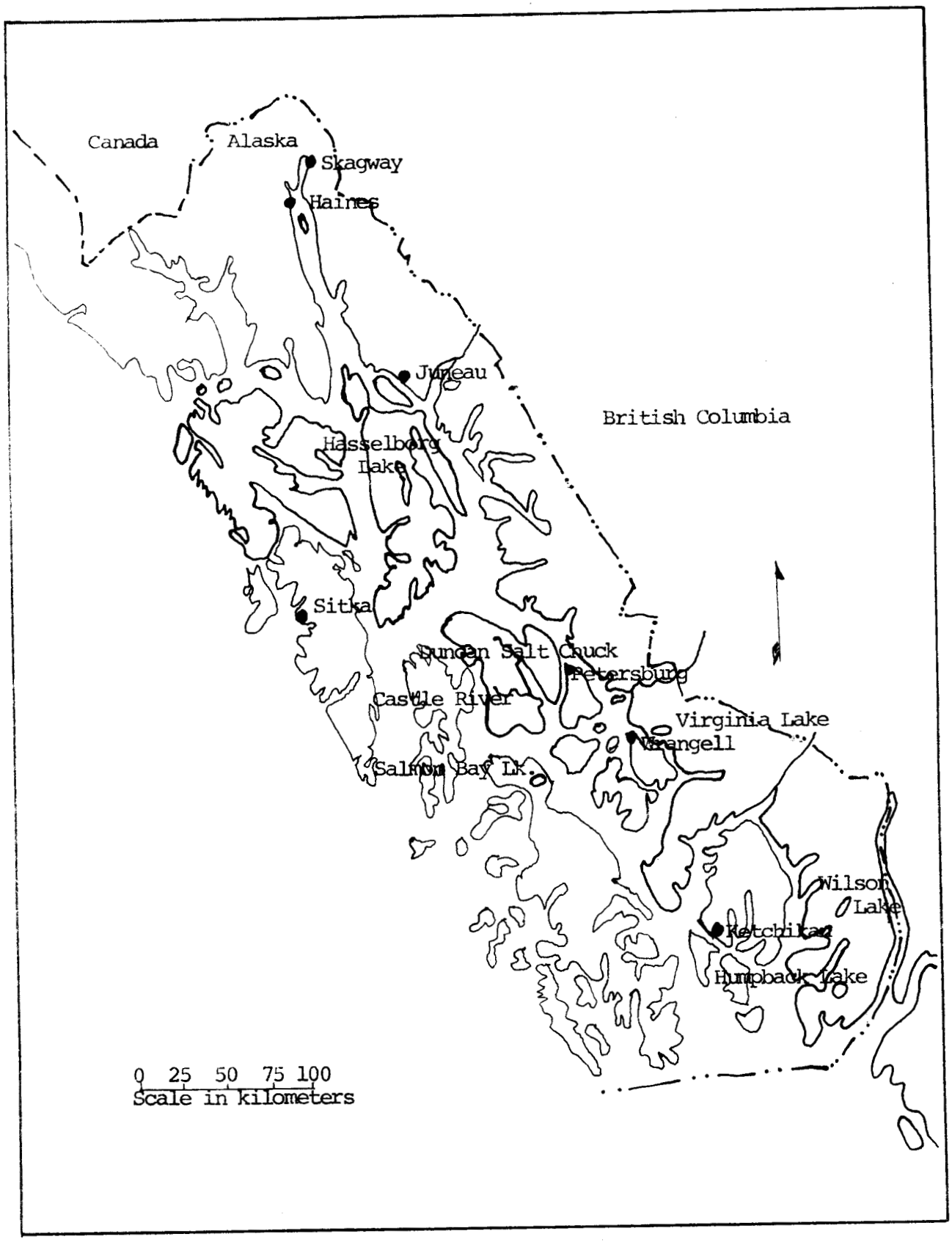
Number of cutthroat _____

Number of Dolly Varden _____

Number of rainbow _____

Number of salmon _____

Figure 9



Cutthroat Fisheries Censused in 1979

Figure 10

Table 4. Angler Survey Response from Eight Area Cutthroat Systems 1979.

Water	No. Survey Forms Issued	No. Forms Received	Percent Returned
Wilson Lake (2 Cabins)	50	5	10.0%
Humpback Lake	13	7	54.0%
Salmon Bay Lake	17	2	12.0%
Virginia Lake	16	1	6.0%
Castle River (2 Cabins)	21	4	19.0%
Duncan Salt Chuck (2 Cabins)	12	5	42.0%
Hasselborg Lake (3 Cabins)	55	5	9.0%
Turner Lake (2 Cabins)	41	7	17.0%
Total	225	36	16.0%

Table 5. Harvest Summaries for Eight Area Cutthroat Systems, 1979.

Water	No. of Anglers	Angler Hours	Fish Caught & Kept CT	DV	RB	Salmon	Fish Caught & Released CT	DV	RB	Salmon
Wilson Lake	15	450	287	2	...	1	128	2	...	3
Humpback Lake	23	626	220	...	...	11	184	6	...	8
Salmon Bay Lake	6	88	40	2	1	7	14	10	...	1
Virginia Lake	6	192	70	10	...	1	15	10	...	...
Castle River	21	364	146	96	...	57	2	10	...	...
Duncan Salt Chuck	18	620	94	59	...	49	7	11	...	...
Hasselborg Lake	24	750	159	6	...	19	84	...	...	...
Turner Lake	33	724	184	28	...	3	60	...	...	...

Cutthroat trout harvest was again found to be heaviest in the Ketchikan area where 8,401 fish were reported harvested. This is up 9.4% from the 7,908 fish harvested in 1977. The Yakutat area again reported the area low with 136 cutthroat harvested. The area-wide 1978 harvest of 23,188 is only slightly higher than the 23,058 reported harvested in 1977.

Development of Techniques for Estimating Cutthroat Trout Populations from Selected Southeast Alaska Lakes

The standing population size for cutthroat trout in lakes in southeast Alaska has not been well documentated. An estimate of an anadromous cutthroat population is possible through the use of a weir, however, no serious attempts have been made to estimate the resident or non-anadromous cutthroat populations of the area lakes. The first attempts to estimate non-anadromous cutthroat populations were carried out by (Schmidt, 1979) at Red Bay Lake. This program was expanded in 1979 to cover Virginia Lake and Harvey Lake.

Virginia Lake

Virginia Lake is located on the mainland southeast of Wrangell on Eastern Passage. Virginia Lake is one of the more popular sport fishing lakes near Wrangell and boasts a reputation as a "trophy" cutthroat lake, however, complaints have been received in the last year that Virginia Lake was "fished out". To determine the status of the cutthroat population in Virginia Lake a population estimate program was carried out during 1979. A total of 24 days were spent at Virginia Lake between June 12, 1979 and September 13, 1979.

Capture gear employed for the population sample included; fyke nets, fry traps and hook and line (Table 6).

Of the three types of capture gear, hook and line proved to be the most effective. Fry traps were almost as effective while fyke nets were a poor third. Hook and line tended to capture trout over 200 mm while minnow traps captured trout from 85 to 250 mm in length. All size classes were captured in the fyke net. The most successful capture areas were along the north shore (Figure 11) and near the outlet.

All cutthroat captured were marked by removal of the adipose fin (for fish less than 200 mm) or by punching a hole in the upper caudal fin. During the study in 1979 a total of 1,165 cutthroat were captured, marked and released. A total of 89 marked trout were recovered during the season. A Schumacher-Eshmeyer (1943) estimation of the cutthroat population using these data yields a N of 5,631 trout. The estimation range at the 95% confidence level falls between 4,710 and 6,998 individuals. This estimate includes primarily those cutthroat over 90 mm (3.5 in) in length. A sample of 37 cutthroat trout was taken by gill net for age-length relationships (Table 7). It is apparent from this table that age 1 and some age 2 cutthroat were not included in the total population estimate.

Table 6. Capture Methods and Cutthroat Captured in Virginia Lake, 1979.

Date	Fry Traps	Fyke Nets	Hook & Line	Time
6/12-15	3	11	46	20 hrs.
6/19-22	31	74	132	27 hrs.
7/17-20	149	1	94	30 hrs.
8/06-10	116	44	107	19 hrs.
8/20-23	89	8	85	19 hrs.
9/10-13	65	12	99	20 hrs.
TOTAL	452	150	563	

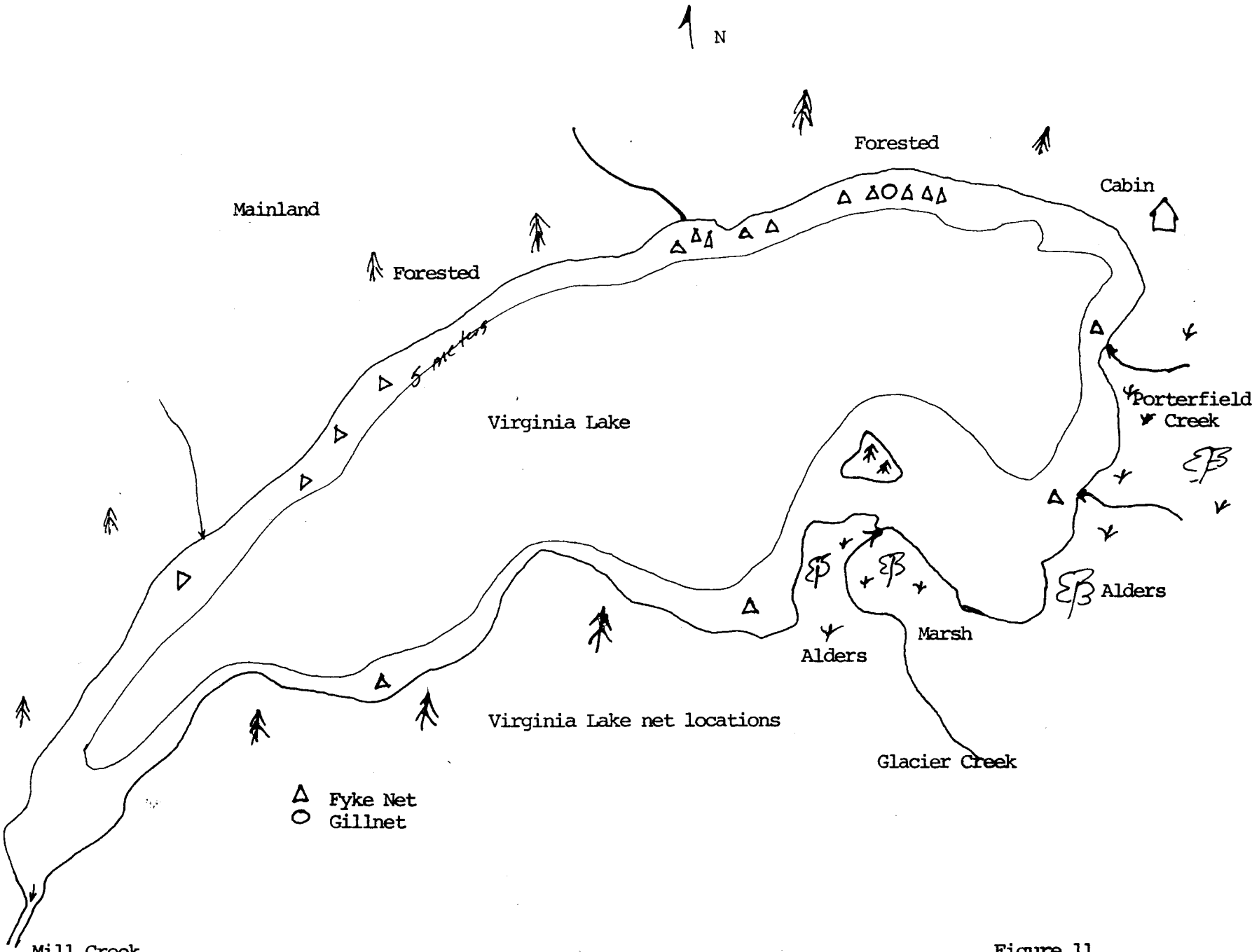

N
Forested
Cabin
Mainland
Forested
5 meters
Virginia Lake
Porterfield
Creek
Alders
Marsh
Alders
Virginia Lake net locations
Glacier Creek
Fyke Net
Gillnet
Mill Creek

Figure 11

Table 7. Age-length Relationship of Cutthroat Trout, Virginia Lake, 1979

Fork Length (mm)	Age (Number of Annuli) 2	3	4	5	6	7	8	9	Total	Percent of Total *
120-140	4	6							10	27.0
141-160			1						1	2.7
161-180			3	1					4	10.8
181-200				2					2	5.4
201-220				2					2	5.4
221-240				2	1				3	8.1
241-260				1	2				3	8.1
261-280					4	3	1		8	21.6
281-300						1	1		2	5.4
301-320							1		1	2.7
321-340								1	1	2.7
Total	4	6	4	8	7	4	3	1	37	99.9
Percent of Total *	10.8	16.2	10.8	21.6	18.9	10.8	8.1	2.7		
Average Fork Length (mm)	122.5	127.5	168.7	210.0	260.5	278.5	291.6	330.0	99.9	

Harvey Lake

Harvey Lake, located on the west side of Woewodski Island, is a popular summer recreation spot for residents of Petersburg and Wrangell. To determine the status of the cutthroat population in Harvey Lake (a typical small island lake), a population estimate program was conducted during 1979. A total of 12 days were spent at Harvey Lake between July 10, 1979 and August 17, 1979.

Capture gear employed for the population estimate was the same as used at Virginia Lake which consisted of hook and line, fyke nets and fry traps. Hook and line was the most successful capture method and accounted for 40 cutthroat captures. Fyke net sets (Figure 12) accounted for a total of 21 cutthroat, while fry traps caught only one trout.

All cutthroat captured were marked with a punch in the upper caudal fin for trout over 200 mm and removal of the adipose fin for trout under 200 mm. During the study in 1979 a total of 89 cutthroat were captured, marked and released. A total of five trout were recaptured during the study. A Schumacher-Eshmeyer (1943) estimate of the cutthroat population using their data yields a N of 669 trout. This estimate includes only those trout over 90 mm (3.5 in) in length. A sample of 27 cutthroat was taken by gill net for age-length relationships (Table 8). Data from this table suggest that ages 1, 2 and possibly some age 3 cutthroat were not included in the total population estimate.

DISCUSSION

The enhancement of exisiting cutthroat trout populations and the creation of new fisheries will be a necessary management objective for specific waters throughout southeast Alaska within the next few years. To achieve this managment goal, a yearly supply of cutthroat will be required. At present, several potential wild brood sources for cutthroat have been investigated, however, at present no cutthroat trout are in residence at any state hatchery.

The magnitude of the annual sport harvest of cutthroat from the areas lakes and streams, largely unknown in the past, has begun to be understood in the last 2 years. A mail questionnaire issued to anglers fishing specific cutthroat waters was initiated in 1978 and was continued in 1979. Response to the questionnaire in 1979 was better than the initial survey, however, it still lacked the response necessary to obtain valid expendable harvest data. A statewide harvest mail survey of sport fishermen was much more successful in obtaining returns and provides an excellent data base on cutthroat harvest. Refinements of the survey will provide information on specific waters where management problems have been identified.

The standing population of cutthroat trout in southeast Alaska lakes has been studied for three area lakes. These studies have shown that cutthroat populations are for the most part less than previously thought. These

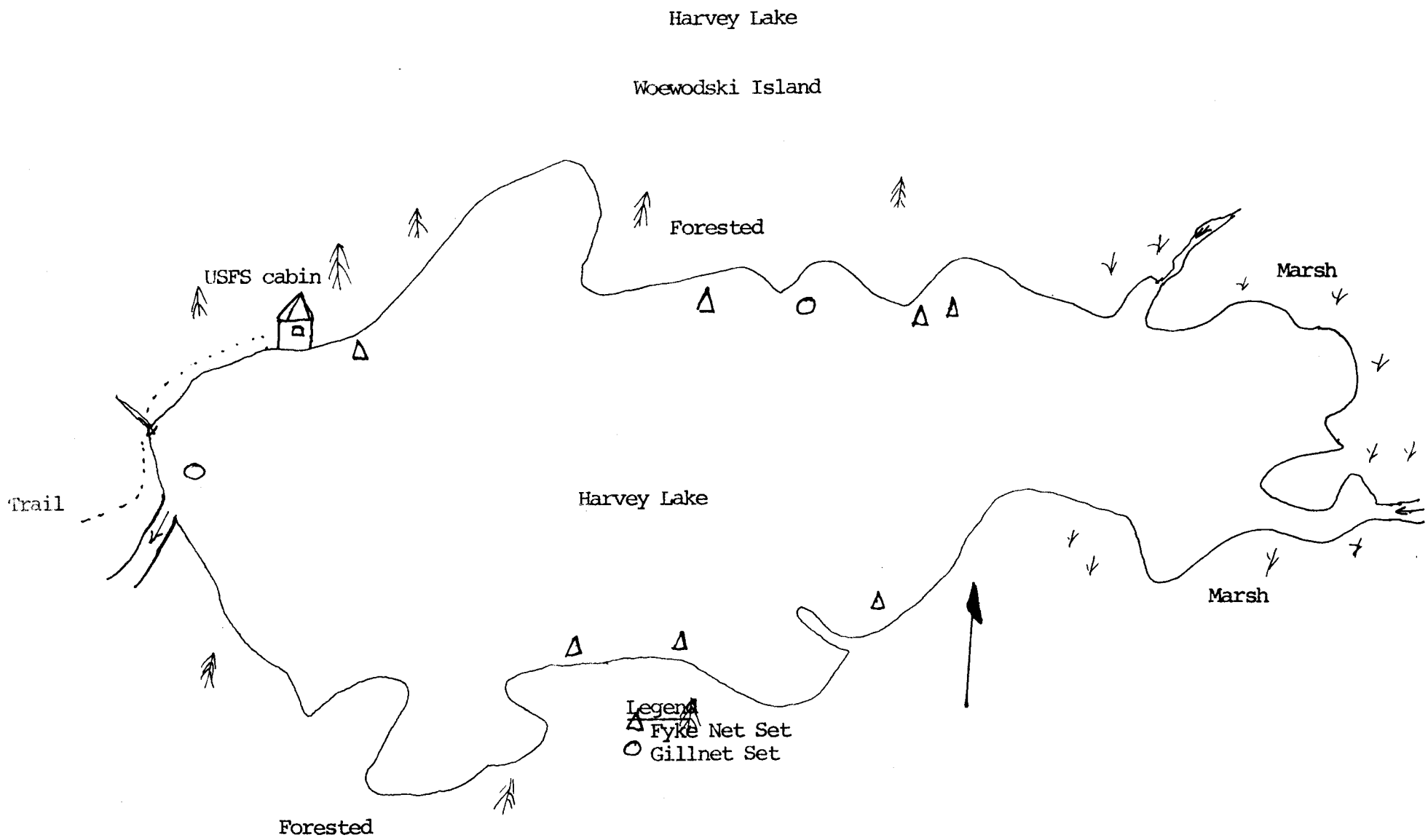

Harvey Lake
Woewodski Island
Forested
USFS cabin
Marsh
Trail
Harvey Lake
Marsh
Legend
Fyke Net Set
Gillnet Set
Forested

Figure 12

Table 8. Age-length Relationship of Cutthroat Trout, Harvey Lake, 1979

Fork Length (mm)	Age (Number of Annuli) 3	4	5	6	7	8	9	11	Total	Percent of Total *
141-160	1								1	3.7
161-180	1	1							2	7.4
181-200		3							3	11.1
201-220			3	1					4	14.8
221-240				4	1				5	18.5
241-260				1	3				4	14.8
261-280					2	1			3	11.1
281-300					1	1			2	7.4
301-320							1		1	3.7
321-340						1			1	3.7
341-360								1	1	3.7
Total	2	4	3	6	7	3	1	1	27	99.9
Percent of Total *	7.4	14.8	11.1	22.2	25.9	11.1	3.7	3.7	99.9	
Average Fork Length (mm)	165.0	191.3	211.6	231.6	262.1	298.3	295.0	360.0		

findings are shedding new light on management practices for cutthroat. Restrictive bag and possession limits will be necessary to preserve the quality cutthroat fishing that now exists. Fishing effort has increased drastically in some areas and approximately 8% overall for southeast Alaska during the past year. This increasing pressure will no longer allow the luxury of large bag limits.

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Prepared by:

Darwin E. Jones
Fishery Biologist

Approved by:

Rupert E. Andrews, Director
Sport Fish Division

Mark C. Warner, Ph.D.
Sport Fish Research Chief